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PATENT
TH1848 (US)
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

DAVIS S. BROWN and
RICHARD E. ROBERTSON

Serial No. 09/832,070 — Group Art Unit: 1755

Filed April 10, 2001 — Examiner: James W. Pasterczyk

NICKEL-CONTAINING ETHYLENE OLIGOMERIZATION CATALYSTAND USE THEREOF — May 30, 2003

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

RESPONSE TO REJECTION

The following remarks are submitted in response to the office action of March 24, 2003. Claims 1-32 have been rejected under Section 103(a) as being unpatentable over the article published in Applied Chemistry, Vol. 14, No. 3, pp. 99-101, 1997. Originally, an abstract was submitted. Now the original article and a translation of it have been submitted and the rejection is based on the translation.

The Examiner states that the reference discloses the invention substantially as claimed and refers to paragraphs 3 and 4 on page 1 of the translation wherein the nickel compound, the borohydride, the benzoic acid ligand, the water soluble base of N,N-dimethylacetamide, and tertiary phosphines are mentioned as being useful as a catalyst in the oligomerization of ethylene to lower alpha olefins. The Examiner refers specifically to the

phosphine $P(OPh)_2$ which appears in Table 2 as number 3. This particular experiment showed a very high distribution of the C_4 alpha olefin (86.41 percent) which was 97.09 percent linear. The higher alpha olefins C_{10+} amounted to only 0.29 percent of the products produced.

The present invention is described in claim 1 as a catalyst composition produced by reacting in a polar solvent in the presence of ethylene a divalent nickel salt, a boron hydride reducting agent, a water soluble base, an o-dihydrocarbylphosphinobenzoic acid or alkali metal salt ligand, and a trivalent phosphite. Preferred phosphites described on page 6 of the specification and in the examples include alkyl phosphites and specific examples include triisopropyl phosphite, triisobutylphosphite, tri-secbutylphosphite, trimethylphosphite, triethylphosphite, tri-N-propylphosphite, and tri-N-butylphosphite.

Referring to the reference, it seems to be clear that the reference talks about introducing phosphines into the catalysts referred to therein (second paragraph on page 1). Also, the reference may be describing tertiary phosphines but that is unclear because in the last paragraph on page 2 of the translation, the phosphine $P(C_4H_2)_2$ is mentioned and other divalent phosphines are listed in Table 2. The article itself seems to confirm this. It is on the abstract which lists the compounds as all being trivalent.

The Applicants asserts that there is a distinction between the materials used by the reference and the materials claimed herein. The Applicants claim the use of trivalent phosphites. The reference discloses the use of phosphines. Page 907 of Hawley's Condensed Chemical Dictionary, Twelfth Edition, defines phosphine as hydrogen phosphide and shows the formula PH_3. Phosphite is defined on that page as a salt of phosphorus acid such as in sodium phosphite. At page 1168, the formula for tri-N-butyl phosphine is given as $(CH_3CH_2CH_2CH_2)_3P$ and the formula for tributyl phosphite is given as $(C_4H_9O)_3P$.

Applicants assert that these definitions clearly show that their claimed phosphites are different from the disclosed phosphines in the reference. It is unclear what the phosphine in number 3 of Table 2, $P(OPh)_2$ is because it is referred to as a phosphine but has an oxygen atom in it. This compound certainly is not a trivalent phosphite as required by the present claims because there are only two substituent groups disclosed. The other materials mentioned and listed in the reference are clearly phosphines rather than phosphites.

The Applicants assert that this reference does not disclose or suggest the use of trivalent phosphites as is required by their claims. Therefore, the Applicants assert that the Section 103 rejection should be withdrawn.

Claim 7 requires that the phosphite be an alkyl phosphite. The same is true for claim 29. Claims 8, 19, 21, 30, and 32, all require that the trivalent phosphite be triethyl

phosphite. None of the phosphines disclosed by the reference are trialkyl phosphines. $P(C_4H_2)_2$ used in number 4 in Table 2 is not trivalent and is certainly not alkyl. Number 2 in Table 2 contains alkyl groups but also requires the presence of a phenyl group. Numbers 5 and 6 are clearly not alkyl. Number 3 may be a phosphite but it is not trivalent and it is clearly not alkyl.

Because of these differences, the Applicants assert that all of the claims which are limited to trialkyl phopshites and triethyl phosphite are patentable independently of the rest of the claims in this application. These preferred materials are not disclosed by the reference. There is no suggestion in the reference to lead one of ordinary skill in the art to use the claimed phosphites.

The Applicants believe that the Section 103 rejection has been overcome and respectfully request an early notice of allowance.

Respectfully submitted,

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